

Borehole

10-06-04**Log Event A****Borehole Information**

Farm : <u>A</u>	Tank : <u>A-106</u>	Site Number : <u>299-E25-75</u>
N-Coord : <u>41,296</u>	W-Coord : <u>47,552</u>	TOC Elevation : <u>686.90</u>
Water Level, ft : <u>123.50</u>	Date Drilled : <u>5/31/1962</u>	

Casing Record

Type : <u>Steel-welded</u>	Thickness, in. : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>125</u>	

Cement Bottom, ft. : 130 Cement Top, ft. : 125

Borehole Notes:

Borehole 10-06-04 was drilled in May 1962 to a depth of 75 ft with 6-in. casing. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. In August 1978, this borehole was deepened to 130 ft and the 6-in. casing was extended to a depth of 125 ft. An 18-ft length of temporary 8-in. surface casing was installed to facilitate the deepening of the borehole. The annulus between the 6-in. borehole casing and the 8-in. surface casing was stemmed with grout from 18 ft to the ground surface as the surface casing was withdrawn. The bottom of the borehole was backfilled with grout from 130 to 125 ft. There is no mention that the 6-in. casing was perforated.

"As-built" drawings for the A Tank Farm indicate the original borehole was constructed with 6-in., schedule-30 pipe; however, this type of pipe was not identified in applicable engineering references. The thickness of the borehole casing is assumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. casing.

The top of the borehole casing, which is the zero reference for the SGLS, is approximately flush with the ground surface.

Equipment Information

Logging System : <u>1</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>10/1996</u>	Calibration Reference : <u>GJO-HAN-13</u>	Logging Procedure : <u>P-GJPO-1783</u>

Logging Information

Log Run Number : <u>1</u>	Log Run Date : <u>10/14/1996</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>0.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>7.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

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Log Run Number :	<u>2</u>	Log Run Date :	<u>10/15/1996</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>123.5</u>	Counting Time, sec.:	<u>100</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>52.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Log Run Number :	<u>3</u>	Log Run Date :	<u>10/16/1996</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>6.0</u>	Counting Time, sec.:	<u>100</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>10.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Log Run Number :	<u>4</u>	Log Run Date :	<u>10/17/1996</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>53.0</u>	Counting Time, sec.:	<u>100</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>9.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Log Run Number :	<u>5</u>	Log Run Date :	<u>10/17/1996</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>25.0</u>	Counting Time, sec.:	<u>100</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>10.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Logging Operation Notes:

This borehole was logged by the SGLS in five log runs. Four log runs were required to log the borehole. An additional log run was performed to repeat an interval of the borehole as a quality check. The total logging depth achieved was 123.5 ft.

Analysis Information

Analyst : E. LarsenData Processing Reference : MAC-VZCP 1.7.9Analysis Date : 03/18/1998**Analysis Notes :**

The pre-survey and post-survey field verification for each logging run met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the accepted calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

A casing correction factor for a 0.280-in.-thick steel casing was applied to the concentration data during the analysis process. Shape factor analysis was applied to the SGLS data and provided insights into the distribution of Co-60 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to



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calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

The interval between 10 and 25 ft was relogged as a quality assurance measure to establish the repeatability of the radionuclide concentration measurements. The radionuclide concentrations shown were calculated using separate data sets provided by the original and rerun logging runs.

A plot of the shape factor analysis results is also included. The plot is used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole.

Results/Interpretations:

The man-made radionuclides Cs-137 and Co-60 were detected in this borehole. The Cs-137 contamination was measured continuously from the ground surface to a depth of 12.5 ft. A small zone of continuous Cs-137 contamination was detected from 13.5 to 15.5 ft. Several isolated occurrences of Cs-137 were detected between 49 and 78.5 ft. The Co-60 contamination was measured continuously from 15 to 23 ft.

Decreased K-40 concentration values occur from 1 to 4 ft and 6 to 14.5 ft. Increased KUT concentration values occur between 50 and 55 ft. The KUT concentrations increase at about 117 ft and generally remain elevated to the bottom of the logged interval (123.5 ft).

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank A-106.